VERIFICATION OF A TRANSLATION

I, the below named translator, hereby declare that:

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That I am knowledgeable in the English language and in the language in which the below identified Japanese application was filed, and that I believe the attached English translation of the Japanese Patent Application No. HEI 11-304070 filed on October 26, 1999 is a true and complete translation of the above-identified Japanese application as filed.

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DOCUMENT NAME	Application for Patent
APPLICATN'S REFERENCE NUMBER	PC-9900188
FILING DATE	October 26, 1999
ADDRESS	Commissioner of the Patent Office
INTERNATIONAL PATENT CLASSIFICATION	A61H 7/00
NUMBER OF CLAIMS	5

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IDENTIFICATION OF FEE

DEPOSIT ACCOUNT NUMBER	001579	
AMOUNT OF FEE	21000	

LIST OF DOCUMENTS ATTACHED

DOCUMENT NAME	Specification	1
DOCUMENT NAME	Drawings	1
DOCUMENT NAME	Abstract	1
NUMBER OF GENERAL POWER OF ATTORNEY		9608003

REQUEST OF PROOF Yes

[Document Name] Specification

[Title of the Invention] MASSAGING APPARATUS

[Claims]

1. A massaging apparatus comprising a therapeutic member (26) for massaging a user's body, and a supporting body (25) for supporting the therapeutic member (26) via a supporting shaft (30), characterized in that a detector (40) for detecting a load applied to the therapeutic member (26) in an axial direction of the supporting shaft (30) is provided between the supporting body (25) and the therapeutic member (26) in the axial direction.

2. A massaging apparatus comprising a therapeutic member (26) for massaging a user's body provided so as to move along the user's body in the vertical direction, characterized in that

a detector (40) for detecting a load applied to the therapeutic member (26) in the lateral direction is provided, and that

the load applied to the therapeutic member (26) from the body in the lateral direction is detected by the detector (40) while moving the therapeutic member (26) in the vertical direction, and a position of a specific portion of the body in the vertical direction is determined based on the detection.

3. A massaging apparatus as set forth in Claim 2, characterized in that a supporting body (25) for supporting

the therapeutic member (26) via a supporting shaft (30) having a lateral axis is provided, and the detector (40) is provided between the supporting body (25) and the therapeutic member (26) in the direction of the axis of the supporting shaft (30).

4. A massaging apparatus as set forth in Claim 1 or 3, characterized in that the therapeutic member (26) is mounted rotatably about the axis of the supporting shaft (30), and the detector (40) is provided on the supporting body (25) with the movement about the axis of the supporting shaft (30) restrained.

5. A massaging apparatus as set forth in any one of Claims 1 to 4, characterized in that the detector (40) is provided with a pre-load applied.

[Detailed Description of the Invention]

[Technical Field of the Invention]

The present invention relates to a massaging apparatus.

[Prior Art]

A conventional chair type massaging apparatus, as stated in Japanese Laid-Open No. HEI 6-190012, for example, includes a massaging mechanism adapted to move upward and downward with respect to the seatback of the seat, and the massaging mechanism comprises a pair of right and left arms projecting toward the user and a therapeutic member mounted on one end of each of the arms so as to rotate about a lateral axis thereof so that the therapeutic member performs massage such as kneading or

rapping for the neck, shoulders, back and hip of the user.

This massaging apparatus is provided with an automatic therapy mechanism having a program of movement or action of the therapeutic member stored in advance to automatically carry out a series of massaging motion according to the stored program (a series of action such as kneading or rapping).

It is also provided with a mechanism for detecting the height of the user's shoulder automatically so that the vertical position at which the therapeutic member performs massaging motion can be changed automatically according to the seated height of the user prior to perform automatic therapy, and a mechanism for detecting the width and the shape of the body so that an adequate kneading action according to the width of the neck or the like can be performed, and thus provided with a pressure sensor for detecting pressure applied to the therapeutic member from the body in the fore-and-aft directions (hereinafter, referred to as a first sensor) and a pressure sensor for detecting the pressure in the lateral direction (hereinafter, referred to as a second sensor).

More specifically, this massaging apparatus is operated in such a manner that, prior to the automatic therapy, the therapeutic member is moved upward and downward while maintaining the extent of projection of the therapeutic member toward the human body so that the pressure in the fore-and-aft directions applied to the therapeutic member from the shoulder

or the back of the user is detected by the first sensor, the position of the shoulder is determined from the distribution of the detected pressure in the upper and the lower directions, the determined position is set as a point of origin of the massaging motion, and then a series of massaging motion programmed from the point of origin as a reference point is performed successively and upwardly or downwardly.

The second sensor is adapted to detect a pressurizing force of the left and the right therapeutic members toward each other with the user's body interposed therebetween so that massage of an adequate kneading force is performed by determining the width and the shape of the body from the distance between these left and right therapeutic members by moving these left and right therapeutic members upward and downward along the body while adjusting the distance therebetween to keep the pressure constant, and controlling the therapeutic members with feeding back the determined data. The second sensor can also detect the strength of kneading motion (kneading strength) since the second sensor is adapted to detect the pressure applied in the lateral direction.

[Problems to be Solved by the Invention]

As is described thus far, the massaging apparatus of the related art is effective in the respect that an adequate massaging motion can be performed by recognizing the shape or the like of the user's body by means of the first and the second

sensors, but a following disadvantage exists in its pressure detecting mechanism.

The massaging apparatus of this type is constructed in such a manner that the arm is pivoted to the front and back, or is moved to the left and the right by the pressure in the fore-and-aft directions or in the lateral direction applied to the therapeutic member from the body, and the displacement of the spring compressed by the pivotal movement or the left-right movement is detected by the first and the second sensors, whereby the construction is disadvantageously complex because there are pluralities of members such as an arm, a spring, and the like interposed between the first and second sensors and the therapeutic member, and the pressure is absorbed by the deformation of the arm or the like or the rattling or the play at the connecting portion between those members, thereby impairing the accuracy of detection.

Therefore, the accurate determination of the shape of the body is impaired, and the accuracy is hindered when detecting the kneading force by the second sensor.

A massaging apparatus having a pressure sensor incorporated in the therapeutic member has been known in the related art (for example, see Japanese Patent Publication No.2511451), and it has an advantage in terms of the accuracy of detection because there are fewer members interposed between the sensor and the therapeutic member. However,

disadvantageously, the construction of the therapeutic member have to be complex and special because a sensor is incorporated, and the wiring construction of the pressure sensor is complex because the therapeutic member is adapted to rotate.

On the other hand, though massaging motion can be made with an adequate kneading force by providing the second sensor in the massaging apparatus of the related art described above, the second sensor is used only for detecting the width and shape of the human body and provided separately from the first sensor that detects the position of the shoulder of the user in the upper and the lower directions, and thus the two types of sensors are used thereby increasing the cost and impairing the size reduction of the apparatus.

With these circumstances in view, it is a first object of the present invention to provide a massaging apparatus in which a detecting structure of a load applied to a therapeutic member is simplified and accurate detection is ensured.

It is a second object of the present invention to provide a massaging apparatus reduced in cost and size in which detection of kneading strength or the like is enabled by providing a detector for detecting a load in the lateral direction with respect to a therapeutic member and simultaneously a height of a user's shoulder or the like is determined by means of the detector.

[Means for Solving the Problems]

In the present invention, the following technical means are instituted in order to achieve the above-described first object.

A massaging apparatus according to the present invention includes a therapeutic member for massaging a user's body, and a supporting body for supporting the therapeutic member via a supporting shaft, and is characterized in that a detector for detecting a load applied to the therapeutic member in an axial direction of the supporting shaft is provided between the supporting body and the therapeutic member in the axial direction.

In this arrangement, the load in the axial direction of the supporting shaft applied to the therapeutic member can be detected by a simple construction, and the member to be interposed between the detector and the therapeutic member can be eliminated or reduced, thereby enabling improvement of the accuracy of detection. Therefore, when the axial direction of the supporting shaft is oriented in the lateral direction (in the direction of the width of the body), strength of kneading motion by the therapeutic member can be detected accurately, and thus more suitable kneading motion can be performed by a control operation with feeding back the detected value.

In the present invention, the following technical means are instituted in order to achieve the above-described second

object.

Specifically, a massaging apparatus according to the present invention includes a therapeutic member for massaging the user's body provided so as to move along the user's body in the vertical direction, and is characterized in that

a detector for detecting a load applied to the therapeutic member in the lateral direction, and

the load applied to the therapeutic member from the body in the lateral direction is detected by the detector while moving the therapeutic member in the vertical direction, and a position of a specific portion of the body in the vertical direction is determined based on the detected value.

In this case, when the therapeutic member performs kneading motion, a load is applied to the therapeutic member in the lateral direction as a reaction force against a kneading force, and the detector detects the load to determine the strength of a kneading force.

On the other hand, when the therapeutic member presses the body by vertical movement thereof, a load is applied to the therapeutic member from the body as a reaction force. The load generally includes not only components in the fore-and-aft directions (toward the front) and the vertical direction with respect to the user's body, but also lateral components resulting from construction of the therapeutic member, inclination of the supporting shaft and other factors, and

there is a case where a lateral force is generated by the load. Therefore, when the lateral load is detected by the detector, a position of a specific portion of a body in the vertical direction can thus be determined from the detected value.

For example, when determining a position (vertical position) of a user's shoulder, the therapeutic member is moved downward from the side of the user's head toward the shoulder, and brought into contact with the upper surface of the shoulder. At this time, a load having components in the lateral direction is applied to the therapeutic member as a reaction force against a force applied to the shoulder by the therapeutic member. Therefore, the load is detected by the detector to determine the vertical position of the shoulder from the vertical position of the therapeutic member at the moment when the load is detected.

Therefore, in a massaging apparatus according to the present invention, the detector for detecting kneading strength or the like is used also for determining a vertical position of a shoulder or the like, whereby the reduction in cost and size can be realized in comparison with the case where the separate sensors are used for the respective functions.

In the case described above, preferably, the therapeutic member is supported on a supporting body via a supporting shaft having an axis in the lateral direction, and the detector is mounted between the supporting body and the therapeutic member

in the direction of axis of the supporting shaft. In this arrangement, accurate detection of a load is realized in a simple construction.

The present invention is characterized in that the therapeutic member is mounted rotatably about the axis of the supporting shaft, and the detector is provided on the supporting body with the movement about the axis of the supporting shaft restrained. In this arrangement, wiring of the detector can be made easily in a simple construction.

Further, the present invention is characterized in that the detector is provided with a pre-load applied, so as to prevent impairment of accuracy of detection resulting from the rattling or play in the axial direction existing between the supporting body and the therapeutic member.

[Mode for Carrying Out the Invention]

Hereinafter, embodiments of the present invention will be described referring to figures.

Fig. 5 shows an massaging apparatus 1 of the present invention, and the massaging apparatus 1 is a chair type massaging apparatus comprising a main body of the chair (therapeutic bed) 4 including a seat portion 2 on which a user seats, and a seatback portion 3 for supporting the back of the user.

In the seatback portion 3 of the main body 4 of the chair, there are provided a moving frame 6 being movable vertically

by a locomotive drive 5, and a massaging mechanism 7 on the moving frame 6. The front side of the massaging mechanism 7 is covered with a flexible covering member 15 formed of cloth or leather.

The main body 4 of the chair includes a footrest 8, and a leg body 10 having arm rests 9 on both sides of the seat portion 2 formed in one piece in addition to the seatback portion 3 and the seat portion 2. The seatback portion 3 and the footrest 8 are adapted to be angularly moved with respect to the seat portion 2 by means of any suitable electric driving mechanism, a fluid pressure driving mechanism, a manual structure, or the like for reclining operation.

The locomotive drive 5 comprises a longitudinal-feed-thread-shaft 11 rotatably provided vertically along the seatback portion 3, and a power station 12 having a motor with a speed reducer or the like for driving the longitudinal-feed-thread-shaft 11 in the forward and reverse direction, and the longitudinal-feed-thread-shaft 11 vertically passes through suitable portions of the massaging mechanism 7 or the moving frame 6 into a threading engagement therewith. As shown in Fig. 3 and 4, on the left and right sides of the moving frame 6, there are provided a pair of upper and lower traveling roller 13, which are rotatably attached to two guide rails 14 provided vertically in the seatback portion 3. In this arrangement, the massaging mechanism 7 can be vertically moved along the

back surface of the upper half of the user's body sitting on the seat portion 2 toward neck or toward hip by the operation of the locomotive drive 5.

The vertical position (amount of movement) of the massaging mechanism 7 is detected by a vertical position detecting means, not shown. As the vertical position detecting means, appropriate means such as a construction in which the number of rotation or the angle of revolution of the longitudinal-feed-thread-shaft 11 or the power station 12 are converted into pulses by means of a rotary encoder or the like, and that converted pulses are counted, or a construction in which a vertical position of the massaging mechanism 7 is optically detected by a photoelectric sensor or the like is employed.

The locomotive drive 5 may be replaced by a wrapping driving mechanism, an engagement structure of rack-and-pinion, or a hoist drive structure using a fluid pressure cylinder or the like.

The moving frame 6 is rectangular in shape formed by connecting upper and lower ends of left and right frame bodies 6A, 6A with upper and lower frame bodies 6B, 6B, and the massaging mechanism 7 comprises a drive unit 20 having a kneading motion shaft 21 and a rapping motion shaft 22 projecting toward the left and the right sides, a power station 23 including an electric motor connected to the drive unit 20,

a pair of drive arms 24 extending in the lateral direction (in the direction of the width of the user's body) held by the respective motion shafts 21, 22, a supporting arm (supporting body) 25 connected to a tip of each of the drive arms 24, and a roller type therapeutic member 26 rotatably provided on each of upper and lower ends of the supporting arm 25 via lateral supporting shafts 30.

The kneading motion shaft 21 and the rapping motion shaft 22 are laterally disposed in parallel to each other with vertically spaced therebetween. An output from the power station 23 is fed into the drive unit 20 via a belt transmission mechanism or the like so that the kneading motion shaft 21 and the rapping motion shaft 22 are selectively rotated via a transmission shaft, a gear, a clutch, or the like in the unit 20.

Both ends of the kneading motion shaft 21 are provided with inclined shaft portions 21a eccentrically inclined and angularly displaced with respect to the axis of rotation, and the rear end of the drive arm 24 is attached to the inclined shaft portion 21a via a bearing.

The supporting arm 25 is formed of a plate of vertically long V-shape rotated by 90 degrees to the right in side view with its surfaces oriented toward the left and the right, and the vertical midpoint thereof is connected to the tip of the drive arm 24 via a lateral supporting shaft 24a so as to rotate

about the axis thereof. Under the supporting shaft 24a, there is provided a tension coil spring 27 between the supporting arm 25 and the drive arm 24 so that a resiliency which urges the upper portion of the supporting arm 25 forward is provided.

On both ends of the rapping motion shaft 22, there are provided eccentric shaft portions 22a that are off-centered with respect to the axis of rotation in the opposite direction, a lower end of a connecting rod 28 is pivotally connected to the eccentric shaft portion 22a via a bearing, and an upper end of the connecting rod 28 is pivotally connected to a lower surface of the drive arm 24 via a ball bearing or the like.

In this arrangement, when the power station 23 rotates the kneading motion shaft 21, the inclined shaft portions 21a at the both ends of the kneading motion shaft 21 allow the therapeutic members 26 opposing on the right and left sides to each other to perform circumferential movement including lateral movement toward and away from each other, thereby performing kneading motion.

When the rapping motion shaft 22 rotates, the eccentric shaft portions 22a on both ends thereof make the drive arm 24 reciprocate vertically via the connecting arm 28, whereby the therapeutic members 26 perform rapping motion via the supporting arm 25 rotatably connected to the drive arm 24.

While the kneading motion shaft 21 and the rapping motion shaft 22 are adapted so that a power from the power station

23 is selectively transmitted thereto via the clutch in the drive unit 20, separate special power stations may be provided for the motion shafts 21, 22 respectively.

The massaging apparatus 1 of the present invention comprises a detector 40 for detecting a lateral load applied to both or one of the therapeutic members 26 mounted on the upper sides of the left and right supporting arm 25.

In Fig. 1 and Fig. 2 showing a mounting construction of the therapeutic member 26, the supporting arm 25 is provided with the supporting shaft 30 having its axis in the lateral direction so as to project laterally inwardly, the therapeutic member 26 comprises a boss body 31 at the center thereof, and the boss body 31 is rotatably fitted on the supporting shaft 30. On the tip of the supporting shaft 30, a mounting nut 32 for preventing the therapeutic member 26 from falling off is engaged via a washer (holding member) 32a.

The boss body 31 comprises a cylindrical potion 31a to be fitted in the inner periphery of the through hole formed at the center of the therapeutic member 26, and a flange portion 31b provided on the left side and the right side of the cylindrical portion 31a for interposing the therapeutic member 26 therebetween, and the midsection of the cylindrical portion 31a is divided into two portions on the left and the right sides. The outer peripheral surface of the therapeutic member 26 is formed into an arcuate inclined surface 26a curving inwardly

toward the inner side in the lateral direction.

The detector 40 used here is, for example, as shown in Fig. 2(b), a pressure (pressure-sensitive) sensor in which a pressure-sensitive conductive elastomer 40a including conductive particles combined with an elastic material such as rubber as an insulating material is adhered between a pair of electrodes 40b. The pressure sensor 40 is formed into a doughnut disc shape so as to be fitted on the supporting shaft 30 between the supporting arm 25 and the boss body 31 so that the laterally outer side surface thereof is brought into contact with the laterally inner side surface of the supporting arm 25.

The laterally inner side surface of the pressure sensor 40 is covered with a doughnut disc shaped cover plate 36 and the laterally inner side surface of the cover plate 36 comes into contact with the boss body 31. The outer side surface of the cover plate 36 is provided with a plurality of detent projections 42 projected therefrom which are each inserted into an insertion hole 43 formed in the supporting arm 25 so as to be movable along the axis of rotation of the supporting shaft 30.

In this arrangement, the cover plate 36 can push the pressure sensor 40 outward in the lateral direction with the rotation about the supporting shaft 30 restrained.

The cover plate 36 has a function as a pressing member

for pressing the pressure sensor 40 as well as a function as a protecting member for preventing direct contact between the rotating therapeutic member 26 and the pressure sensor 40 to protect the pressure sensor 40 from, for example, being worn.

There is provided spacer members 35, 41 fitted on the supporting shaft 30 for keeping the distance between the boss body 31 and the washer 32a.

These spacer members 35, 41 comprises a first member 35 formed of a synthetic resin such as polyethylene or the like into a doughnut shape, and a second member 41 formed of a resilient material such as polyethylene rubber, sponge rubber or the like, so that the laterally inner side surface of the first member 35 is brought into contact with the boss body 31.

The second member 41 is axially compressed by tightening the mounting nut 32 with respect to the supporting shaft 30, and the resilient restoring force thereof presses the pressure sensor 40 via the first member 35, the boss body 31, and the cover plate 36, whereby the pressure sensor 40 is applied with a pre-load even when the therapeutic member 26 is not subjected to an external force in lateral direction.

The first member 35 and the cover plate 36 is preferably formed of a material of low frictional resistance or a structure in which a friction reduction process is applied on at least the surface that comes into contact with the boss body 31, whereby the rotation of the therapeutic member 26 about the

supporting shaft 30 is performed smoothly.

In this arrangement, when allowing the therapeutic member 26 to perform a kneading motion, a reaction force from the user against its lateral movement provides a lateral load to the therapeutic member 26. In this case, since the therapeutic member 26 presses the pressure sensor 40 via the cover plate 36, the pressure sensor 40 detects the pressure.

The pressure thus detected is proportional to the strength of a kneading force, and thus adequate control of the kneading motion (for example, control to reduce speed when the detected value is large) can be performed by feeding the detected value back to the control unit, thereby realizing more effective kneading motion.

Since pre-load is applied to the pressure sensor 40, the impairment of the accuracy of detection of the load applied to the therapeutic member 26 due to the rattling or the play between the therapeutic member 26 and the supporting arm 25 in the axial direction is prevented, thereby realizing accurate pressure detection.

Since the pressure sensor 40 is provided on the supporting arm 25 (substantially on the supporting shaft 30), not on the therapeutic member 26 rotating about the supporting shaft 30, and the cover plate 36 is prevented from rotating about the supporting shaft 30, the position of the pressure sensor 40 is also controlled so as not to be rotated by the

rotation of the therapeutic member 26, whereby the wiring of the pressure sensor 40 is facilitated and increase in complexity of the configuration of the therapeutic member 26 may be prevented.

The pressure sensor 40 is adapted to be used for determination of the vertical position of the user's shoulder S so that a massaging motion according to the physique of the user can be performed.

In other words, when a massaging motion is started and the therapeutic member 26 is moved from a position beside the head of the user downward until the upper therapeutic member 26 of the supporting arm 25 abuts against the shoulder S, a load F is applied to the therapeutic member 26 as a reaction force against the pressing force applied on the shoulder S.

Though the load F mainly has a vertical component, since the therapeutic member 26 is supported in a overhanging state on the lateral outside thereof, a moment as shown by the arrow M is generated and the moment M generates a force acting to incline the upper portion of the therapeutic member 26 laterally outwardly via the clearance between the supporting shaft 30 and the boss body 31.

The load F substantially includes lateral components that presses the therapeutic member 26 laterally outwardly as shown in a phantom line by the factors such as the inclined surface 26a on the outer periphery of the therapeutic member

26, a slight inclination provided to the supporting shaft 30, and the resilient deformation of the therapeutic member 26 itself.

The force that inclines or outwardly pushes the therapeutic member 26 is detected by the pressure sensor 40 via the cover plate 36, so that the vertical position of the user's shoulder S can be determined from the vertical position (height) of the massaging mechanism 7 (therapeutic member 26) at the moment when the force is detected. Therefore, by setting the height of the shoulder S as a reference position of the massaging motion, a massage according to the physique of the user is realized.

In other words, the pressure sensor 40 according to the present invention is used both for detection of the load during the kneading motion and for determination of the height of the shoulder, whereby reduction in cost and size can be realized in comparison with the case where the separate pressure sensors are used.

While the vertical position of the shoulder S is determined by detecting the load applied from the user's shoulder S by means of the pressure sensor 40 in this embodiment, it is also possible to detect a load applied from the user's back or the hip by the pressure sensor 40 and to determine a vertical position of the hip or the like by analyzing the pressure distribution.

It is also possible to construct in such a manner that the vertical position of the shoulder is determined in the process of moving the therapeutic member 26 upward from a position of the user's hip, and in this case, the shoulder position can be determined from the position of the therapeutic member 26 at the moment when the therapeutic member 26 moves away from the shoulder upwardly and the load is not detected any more.

Fig. 6 shows a second embodiment of the present invention.

In this embodiment, a pressure sensor 40 is not provided around an entire circumference of the supporting shaft 30, but provided partially at a portion corresponding to an upper portion of the therapeutic member 26, and the pressure sensor 40 is mounted to the supporting arm 25 via a mount 33 mounted on the supporting shaft 30.

The mount 33 is formed into a doughnut shape and fitted on the supporting shaft 30, and formed with a recessed storing portion 34 for fitting the pressure sensor 40 therein on an upper portion of the laterally inner side surface. In addition, recessed portions 43a are formed at the front and rear portions of the same inner side surface, so that detent projections 42a formed at the front and rear portions of the laterally outer side surface of the cover plate 36 is fitted therein to prevent relative rotation between the mount 33 and the cover plate 36.

The laterally outer side surface of the mount 33 is formed with a plurality of second detent projections 42b projecting therefrom, and the second detent projections 42b are inserted into through holes 43b formed in the supporting arm 25, so that the rotation of the mount 33 about the supporting shaft 30 is prevented.

When the pressure sensor 40 is fitted into the storing portion 43, a slight gap is formed between the mount 33 and the cover plate 36, so that the pressure sensor 40 can be pressed within the range of the gap.

In this embodiment, since the pressure sensor 40 is provided partially about the supporting shaft 30, a range of a load to be detected decreases in comparison with the above-described first embodiment. However, since the pressure sensor 40 is provided corresponding to the upper portion of the therapeutic member 26, a force that is generated by contact between the therapeutic member 26 and the shoulder S for laterally outwardly inclining the upper side of the therapeutic member 26 can reliably be detected.

Since the pressure sensor 40 is small and simple in construction, cost reduction can be realized, and rotation about the supporting shaft 30 of the pressure sensor 40 is prevented as the above-described first embodiment, wiring can easily be performed.

Since the pressure sensor 40 is pressed only within the

range of the gap between the mount 33 and the cover plate 36, even when an excessive load is applied to the therapeutic member 26, no overload acts upon the pressure sensor 40, thereby preventing damage of the pressure sensor 40.

The mount 33 may be formed integrally with the supporting arm 25, or formed separately and bonded to the supporting arm 25 by welding or the like. The supporting shaft 30 may be formed integrally with the supporting arm 25 or formed separately and bonded by welding or the like.

Fig. 7 shows a third embodiment of the present invention.

In this embodiment, the pressure sensors 40 (40H, 40L) are provided not only at the upper position of the mount 33, but also at the lower portion thereof via the storing portions 34, and the cover plate 36 is formed of a resilient material such as polyethylene rubber or the like, and the spacer member between the boss body 31 and the washer 32a is omitted.

In this embodiment, since the cover plate 36 is formed of a resilient member, tightening the mounting nut 32 with respect to the supporting shaft 30 compresses the cover plate 36 between the boss body 31 and the mount 33, and its resilient restoring force presses the pressure sensor 40 to provide pre-load.

The cover plate 36 can enter into the storing portion 34 by being resiliently deformed, and thus it can press the pressure sensor 40 when the surface of the pressure sensor 40

is projecting from the surface of the mount 33 as a matter of course, even when the surface of the pressure sensor 40 is in the same level as or lower than the surface of the mount 33. However, since there is a limit to the amount of entrance of the cover plate 36 into the storing portion 34, even when an excessive load is applied to the therapeutic member 26, overload onto the pressure sensor 40 can be prevented.

In this embodiment, since the pressure sensors 40 are provided at the upper and lower positions of the mount 33, the lateral load applied toward the upper portion or the lower portion of the therapeutic member 26 can be detected independently when performing a kneading motion or the like.

In other words, a kneading motion by the therapeutic member 26 performs circulating movement having components not only in the lateral direction, but also in the vertical direction as shown by the arrow C, C', and thus the different loads are applied respectively to the upper portion and the lower portion of the therapeutic member 26 in a complex manner depending on the orientation (kneading down C and kneading up C') or the portion to be massaged (shoulder, back). In this case, precise kneading control can be performed by detecting the extent of the load applied to each portion every time precisely by the upper and lower pressure sensors 40H, 40L, and feeding detected information back to the control unit.

In this embodiment, as shown in a phantom line, the

pressure sensor 40 may be provided also on the front and rear portions of the mount 33 so that further precise pressure detection can be made. In this embodiment, there is preferably provided a spacer member (first member) 35 as shown in the first and second embodiments between the cover plate 36 and the boss body 31, whereby rotation of the therapeutic member 26 can be performed smoothly and the cover plate 36 can be prevented from being involved in the rotation thereof.

The present invention is not limited to above embodiments, but rather be modifiable as needed.

For example, the spacer member 35, 41 in the first and second embodiments may be omitted, and in this case, it is preferable to provide pre-load to the pressure sensor 40 with the boss body 31 of the therapeutic member 26 by tightening the mounting nut 32.

It is also possible to omit the mount 33 of the second and third embodiments to mount the pressure sensor 40 directly to the plate surface of the supporting arm 25.

The therapeutic member 26 may be mounted to the supporting shaft 30 so as not to be rotated, and in this case, the pressure sensor 40 may be mounted on the therapeutic member 26 on the side surface thereof facing the supporting arm 25.

The massaging mechanism 7 may be adapted not to perform a rapping motion, but to perform a kneading motion only, or may be adapted to perform other massaging motions.

Alternatively, the therapeutic member 26 may be driven by fluid pressure with using an air cell or the like. The left and the right therapeutic members 26 may be constructed so that the lateral distance therebetween is adjustable, or the massaging mechanism 7 may be arranged to be movable to the left and to the right as a whole.

Detailed configurations of the supporting arm, the drive arm, the therapeutic member, or detailed construction of the detector (the pressure sensor) can be modified as appropriate. In addition, the therapeutic bed of the massaging apparatus is not limited to the chair type, but it may be other configurations.

[Effect of the Invention]

As is described thus far, in the present invention, the load applied to the therapeutic member can be detected accurately in a simple structure.

Since the detector for detecting the lateral load applied on the therapeutic member is used for detecting the strength of a kneading motion, and also for determining the vertical position of the shoulder or the like, reduction in cost and size can be realized.

[Brief Description of the Drawings]

Fig. 1 shows a massaging apparatus according to a first embodiment of the present invention, specifically a front cross-sectional view showing a mounting portion of a

therapeutic member.

Fig. 2(a) is an exploded perspective view showing the mounting portion of the therapeutic member, and (b) is an exploded perspective view of a pressure sensor.

Fig. 3 is a side view of a massaging mechanism.

Fig. 4 is a perspective view of the massaging mechanism.

Fig. 5 is a perspective view of the massaging apparatus.

Fig. 6 shows a massaging apparatus according to a second embodiment of the present invention, wherein (a) is a front cross-sectional view of a mounting portion of a therapeutic member, and (b) is an exploded perspective view of the same.

Fig. 7 shows a massaging apparatus according to a third embodiment of the present invention, wherein (a) is a front cross-sectional view of a mounting portion of a therapeutic member, and (b) is a perspective view of a supporting bed and a pressure sensor.

[Description of the Reference Numerals]

1 massaging apparatus

7 massaging mechanism

25 supporting arm (supporting body)

26 therapeutic member

30 supporting shaft

40 detector

FIG. 1

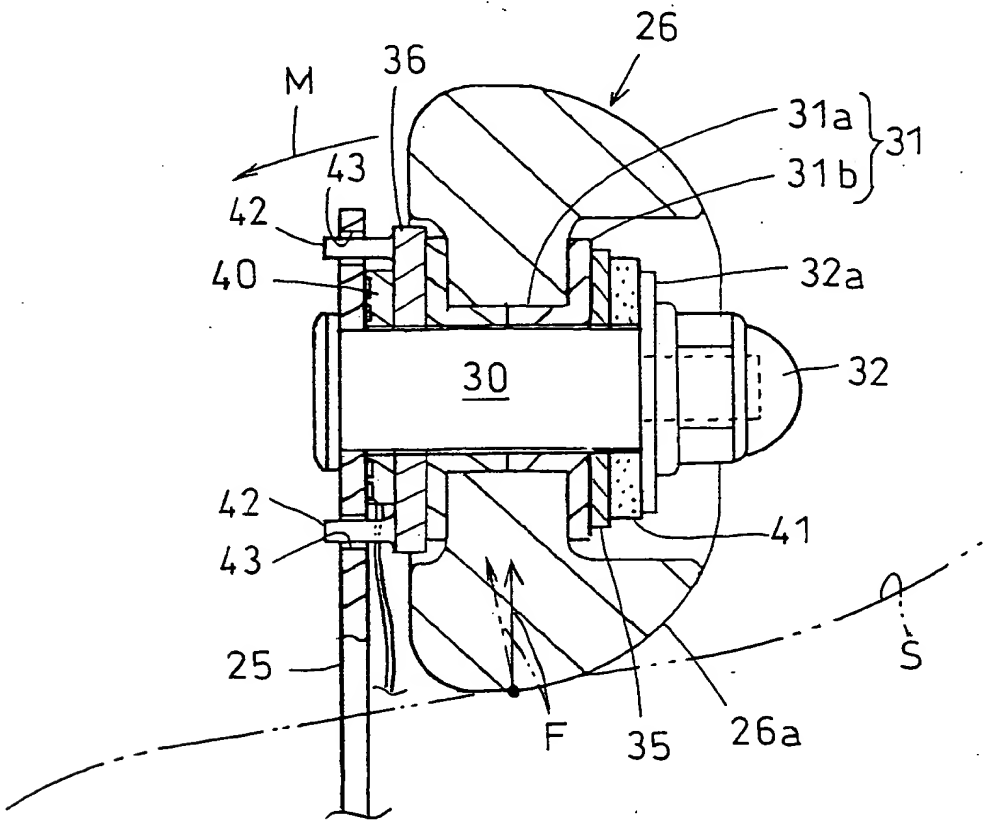
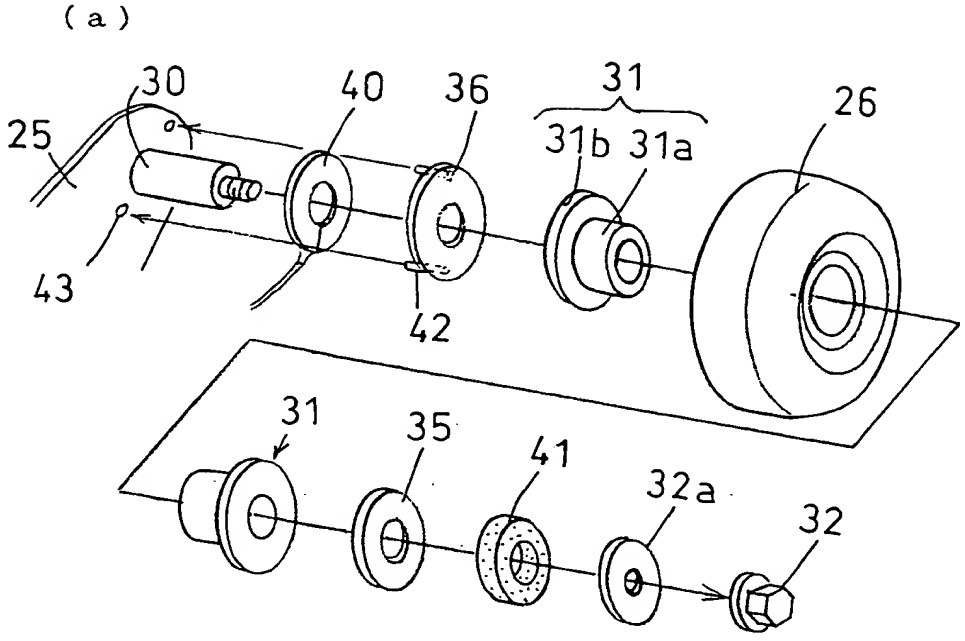


FIG. 2



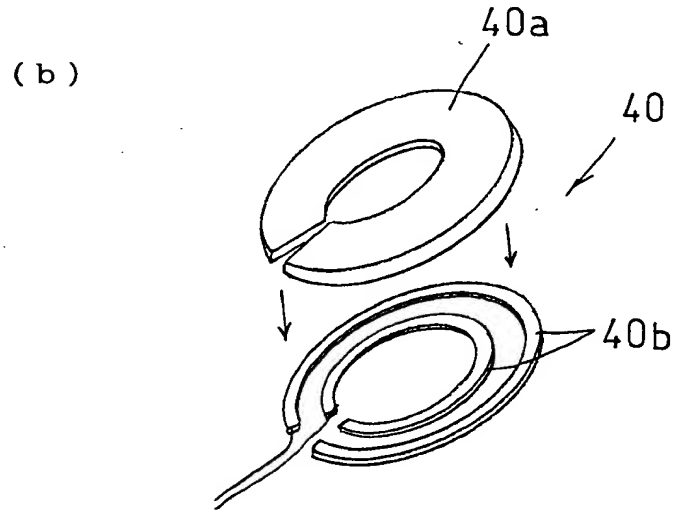
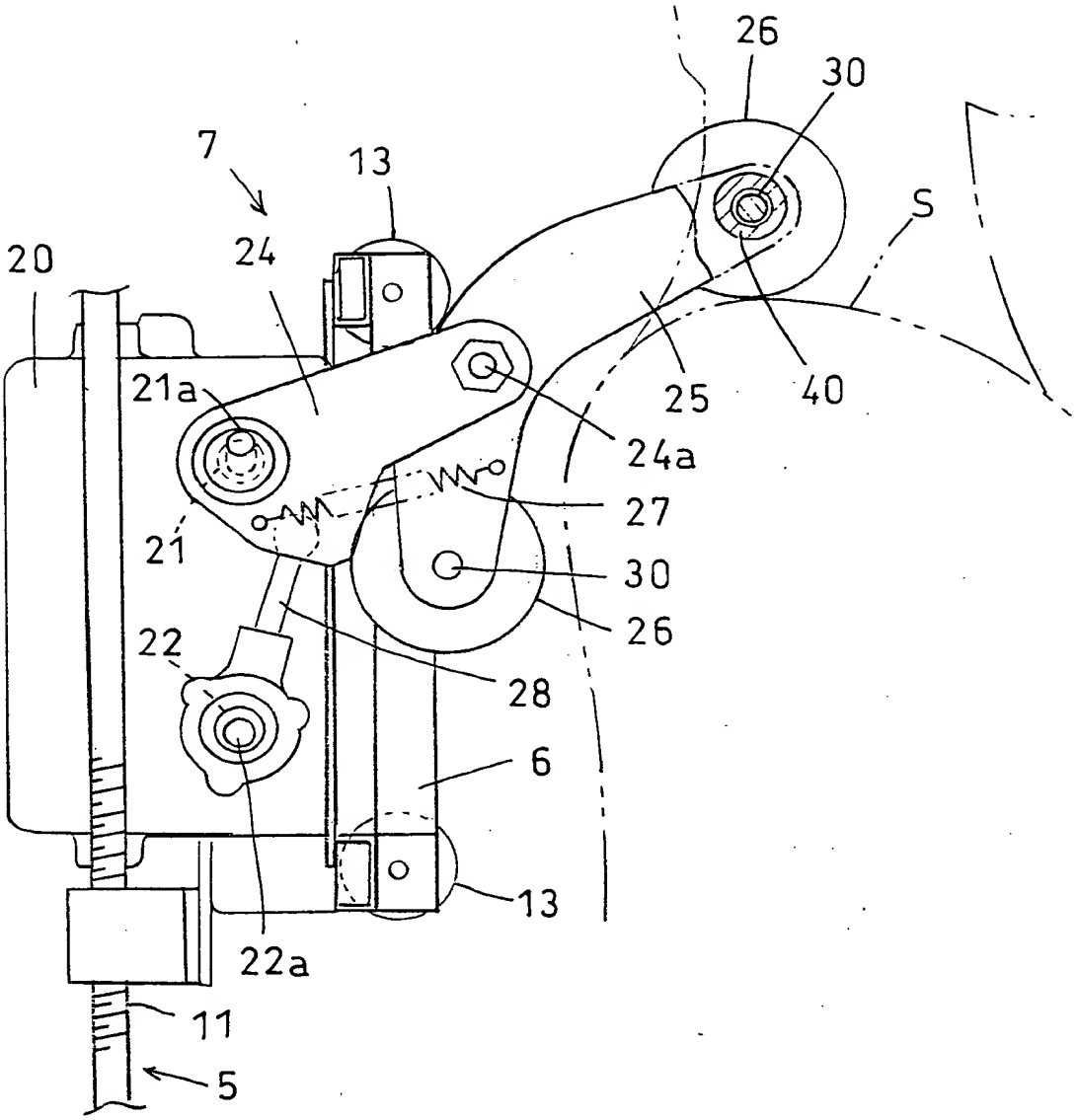


FIG. 3



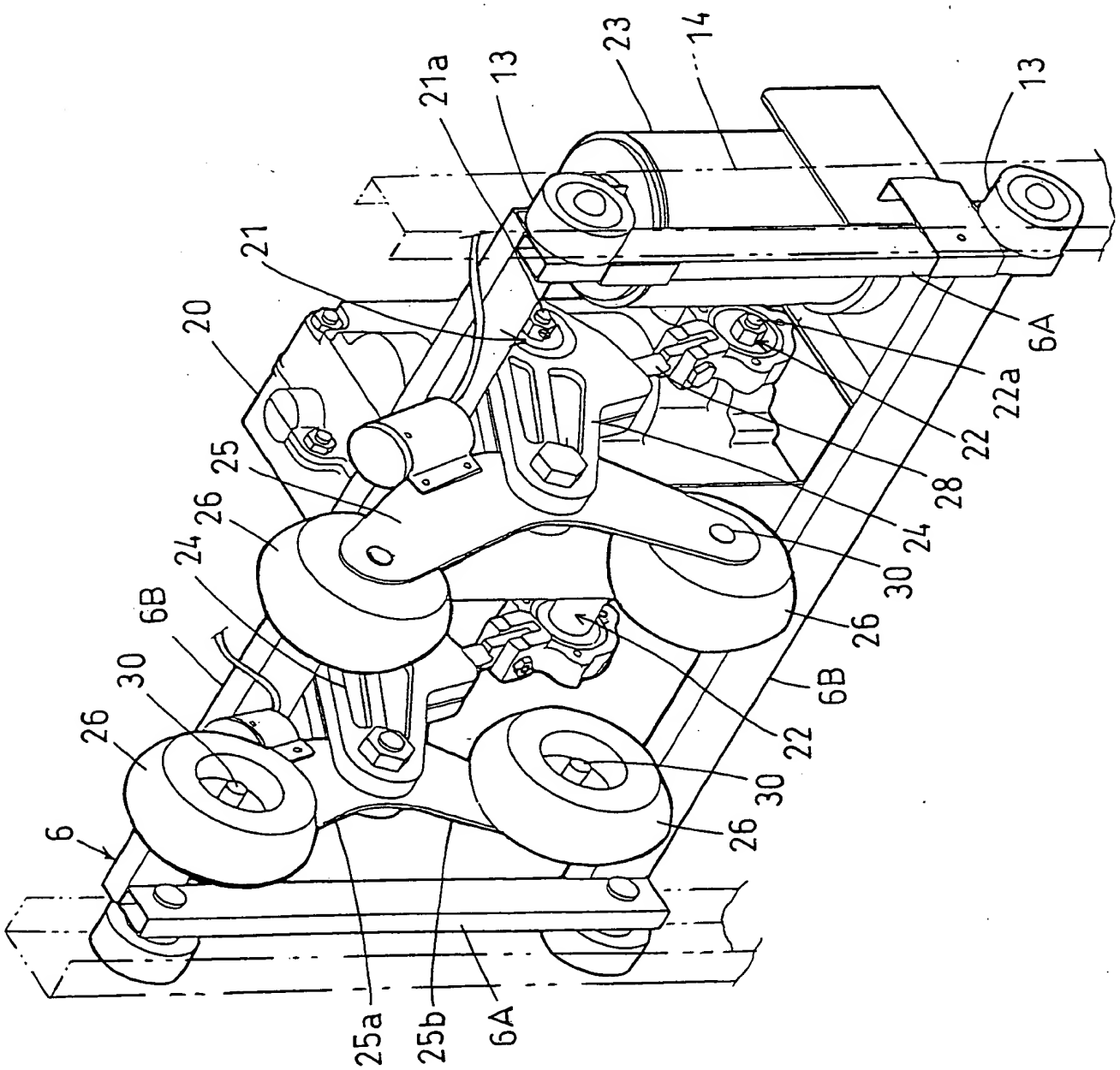


FIG. 4

FIG. 5

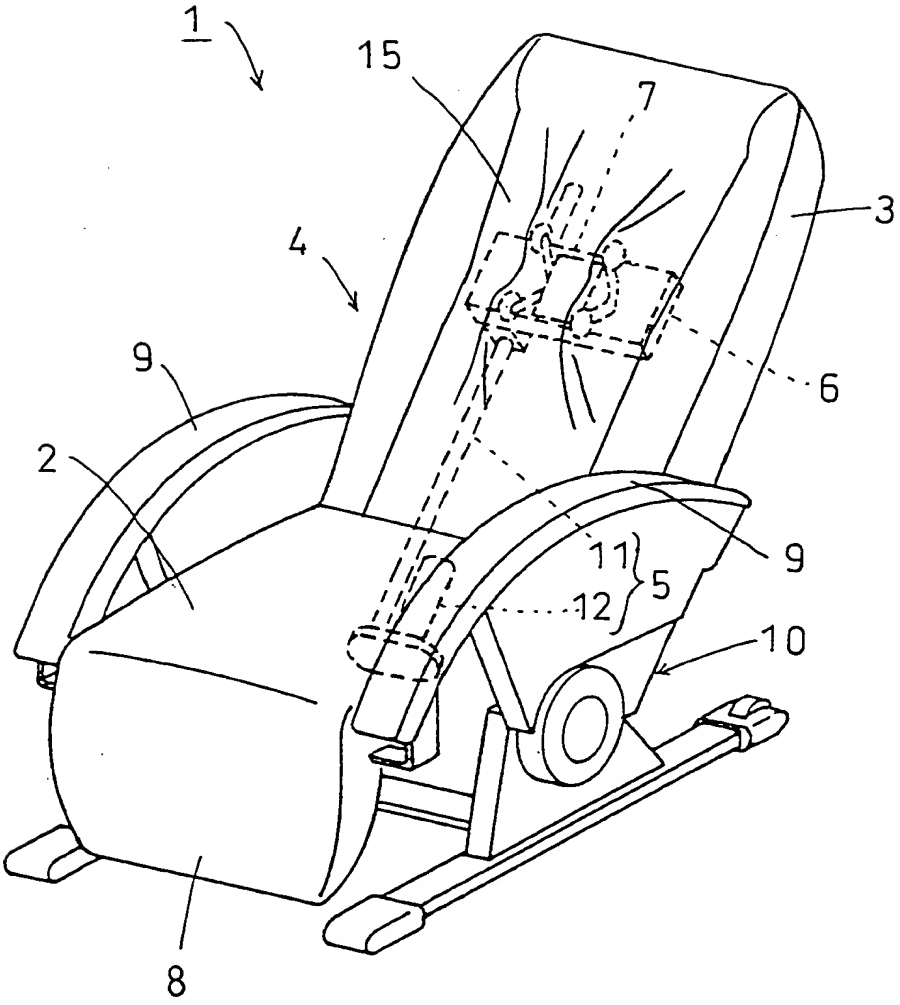
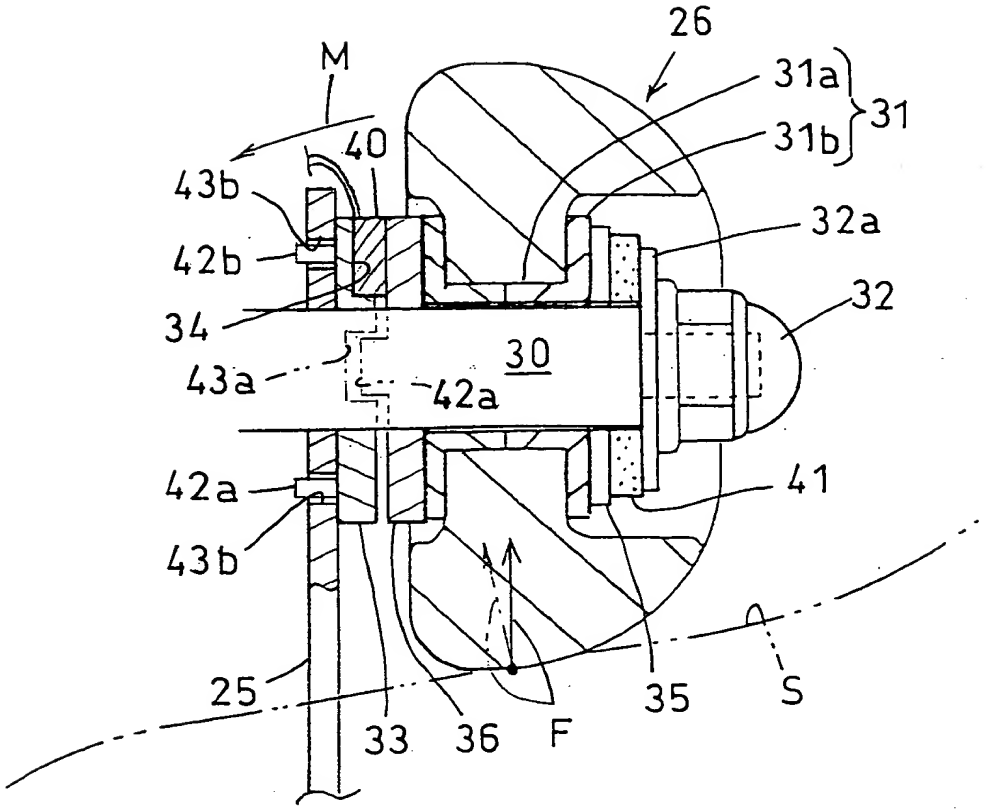


FIG. 6

(a)



(b)

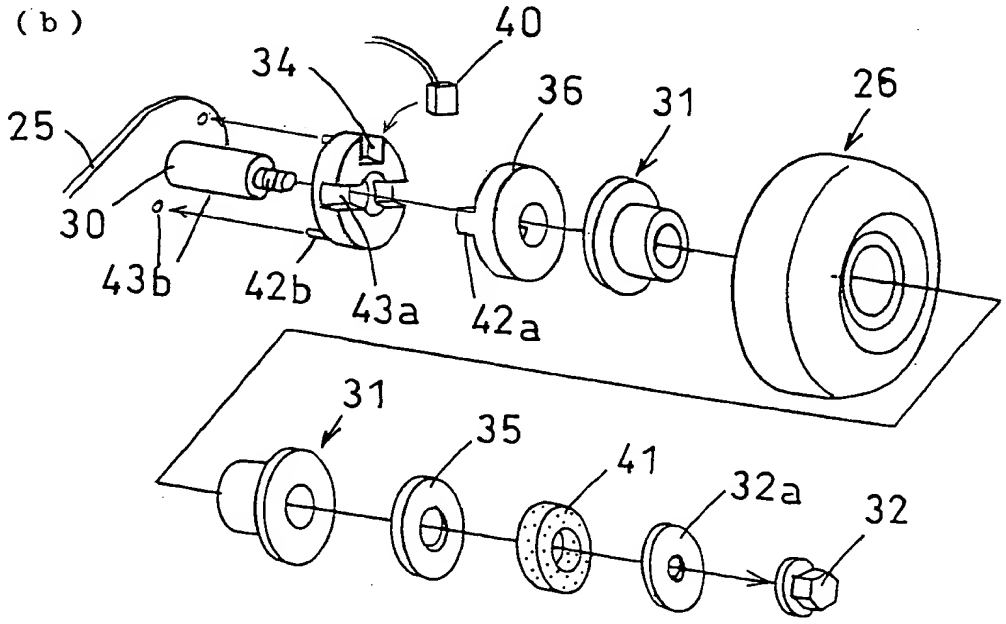
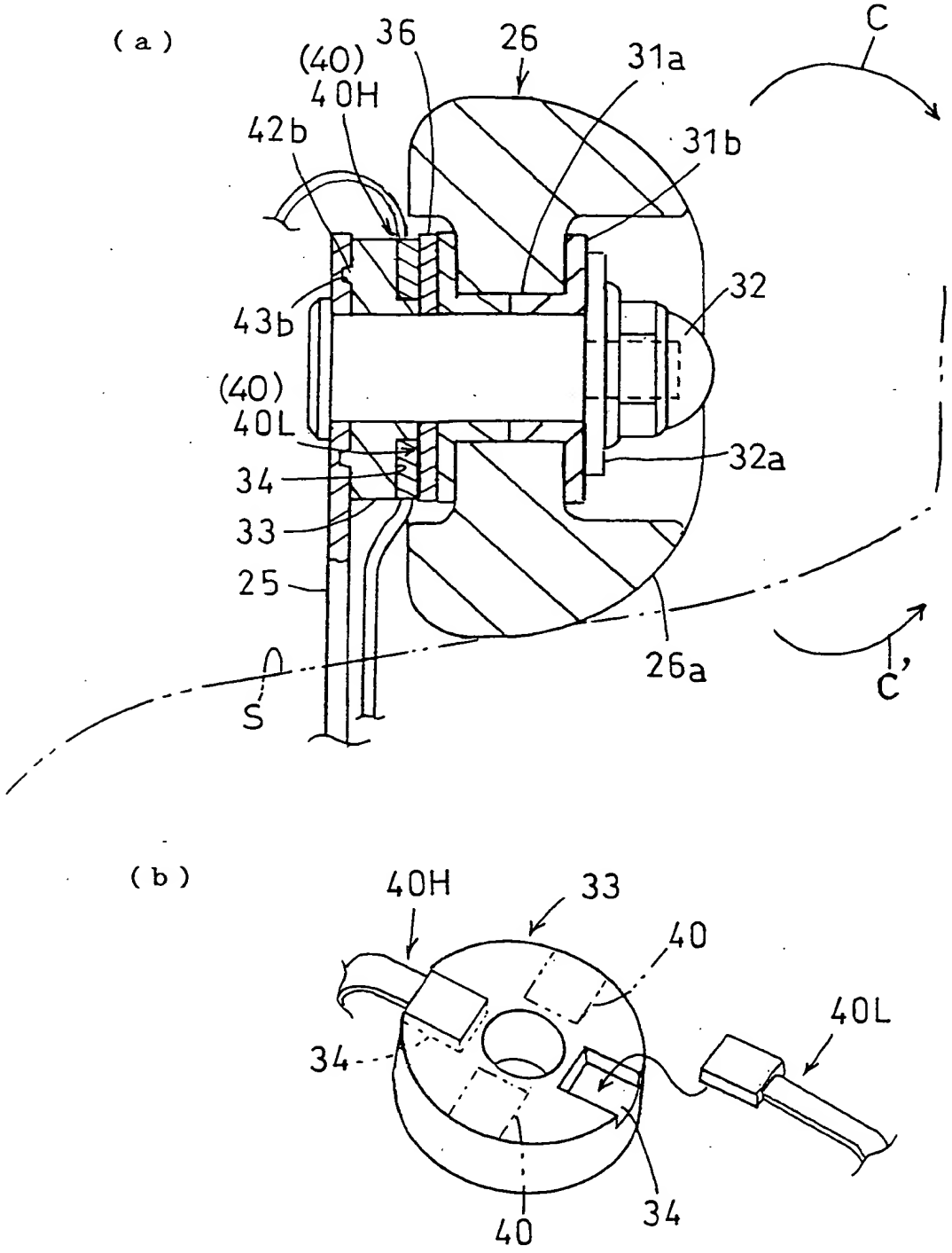


FIG. 7



[Document Name] Abstract of the Disclosure

[Abstract]

[Object]

To provide massaging apparatus having a detector for both determining a vertical position of a shoulder and detecting strength of a kneading motion.

[Means for Solving the Problem]

A massaging apparatus is provided with a detector 40 for detecting a load applied to a therapeutic member 26 in the lateral direction so that the detector 26 detects the load applied to the therapeutic member 26 from the shoulder S in the lateral direction A, while the therapeutic member 26 is moving in the vertical direction, and a position of the shoulder S of the user in the vertical direction is determined based on the detection.

[Selected Drawing] Fig. 1